

# Architectural paint research in Lower Silesia

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Research on the historical colours of Silesian architecture has been undertaken in order to identify original colour schemes of exteriors from the Middle Ages to the present day. Archival research was identified as a source of data on original colour schemes, and the following sources were analysed: documents recording examinations of exteriors, written sources, and colourful depictions. As a result, numerous colour schemes were detected. This paper discusses selected issues on architectural paint research that took place in Lower Silesia in the years 1945-2014. In the first part, the paper presents selected findings of historical colour schemes resulting from later repainting, whereas in the second part, it tackles several technical issues about paint research. The study deepens the knowledge of historical colour schemes of Lower Silesia. It may also enable the improvement of historical paint analysis, thereby allowing better preservation of original polychromes and, as a result, monuments restored closer to their original state.

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## Introduction

Paint research, or paint analysis, aims to determine the colours and components of architectural finishings originally applied to buildings as well as during significant refurbishments and expansions. Besides, it also focuses on determining techniques used in the past. In this way, paint research enables to conserve monuments' finishings with the use of materials similar to the original substances in terms of texture, colour and technique. It is usually conducted by certified conservators and reports made after examinations serve public officials and architects as guidelines for monument restorations.

Since this part of history of architecture has been scarcely examined and there have been many misunderstandings concerning preservation of historical colour schemes, research on the original colour schemes of Lower Silesia was initiated in the mid-1990s at the Wrocław University of Technology. Thus far, selected examples of historical colour schemes have been presented in scattered articles on Silesian architecture and in conference proceedings [e.g. 1-2]. Numerous examples of historical colour schemes of Wrocław have been already discussed by the author [3]<sup>1</sup>, and the following paper provides additional information on architectural paint analyses, not included in the previous study.

In regard to paint research, numerous comments on paint analyses conducted world-wide have been discussed in conference proceedings and scattered articles [e.g. 4-8]; however, examinations conducted in Lower Silesia have never been comprehensively addressed<sup>2</sup>.

## Sources and methods

Archival research was identified in order to explore historical colour schemes of Lower Silesia. The following sources were analysed: paint research documentation, design, coloured depictions and written descriptions. Literature studies on local deposits, analyses of minerals stored in museum collections and old colour charts helped to establish shades characteristic of the region.

Due to the dispersion of sources, only paint research documentation was examined regularly and serves as the principal basis for the study. Records stored in the following archives of Conservation Monuments Offices: MKZ Wrocław, WKZ Wrocław, WKZ Legnica, WKZ Jelenia Góra, WZK Wałbrzych were analysed<sup>3</sup>. As a result, the survey conducted in 2010-12 and in 2014 (the second survey took place only in the Wrocław archives) revealed in total two hundred and seventy-seven documents recording paint research on exteriors and one hundred and thirty-seven cases revealed the original colour schemes from the first chronological phase [3, 9].

The colour schemes from the first chronological phase have been already discussed by the author in the study on original colour schemes of Wrocław architecture [3], and the following paper aims to act as a supplement to this publication. Numerous findings which were applied during later repainting are worth being presented to the public since they also contribute to the theoretical knowledge on historical colours. Additionally, examinations of paint research revealed numerous technical problems worth being attended to in order that they can be solved in the near future.

This paper discusses architectural paint research in Lower Silesia in two aspects: as a source of information on historical colour schemes and in the technical aspect. Selected findings are presented in the chronological order in the first part of the article, and selected issues on methodology of paint research and documentation are discussed in the other part<sup>4</sup>.

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<sup>1</sup> The study presents numerous examples of original colour schemes from the Middle Ages to the present day from Wrocław and other parts of Lower Silesia, as well as includes comparative studies with historical colour schemes of Prague, Vienna and Berlin. All the sources (paint research, written sources, designs and depictions) are discussed and results of analyses are presented. The study also includes the detailed literature review on the subject.

<sup>2</sup> It has been only partially discussed by the author of the paper as one of sources of historical colour schemes [3].

<sup>3</sup> Office of Miejski Konserwator Zabytków Wrocław, Wojewódzki Konserwator Zabytków Wrocław, Wojewódzki Konserwator Zabytków Jelenia Góra, Wojewódzki Konserwator Zabytków Legnica, Wojewódzki Konserwator Zabytków Wałbrzych. Part of documentation was provided directly by conservators, architects or investors.

<sup>4</sup> The issues on technical side of paint research are made from the point of view of an architect who takes part in conservation process.

## Architectural paint research – source of information on historical colours

Apart from data on colour schemes from the construction time or significant refurbishments connected with a new style of façade redecoration, documents often contain information on colour schemes related to later repainting. Those facts are the additional proof that certain colour schemes were used in certain époques. Besides colour schemes originally applied and discussed in the previous study [3], the analysis of Silesian records provide information on colour schemes coming from repainting from different historical styles. These findings are presented below in chronological order from the Renaissance until the Modernist Movement<sup>5</sup>. Selected examples of exterior colour changes throughout centuries are presented at the end of this section.

### *The Renaissance refurbishments*

Remains of historical paint were discovered on a medieval dwelling at 6 Rynek, Wrocław. The façade was refurbished in 16<sup>th</sup> and 17<sup>th</sup> centuries, and rebuilt in the Baroque style in 1727. Remains of red-pink paint (1<sup>st</sup> chronological phase) and light yellow ochre (2<sup>nd</sup> chronological phase) were discovered in one sample and estimated as the part of the colour schemes from before the Baroque refurbishment [10].

A medieval dwelling at 23a Rynek, Świdnica, was refurbished a few times throughout centuries. Pink, either pink plaster or pink paint on whitewash, was established to be the Renaissance colour.

### *The Baroque and Classical refurbishments*

The imitation of marble was detected on the walls in the castle's courtyard in Pruszków. Remains of plaster dated back to the Baroque refurbishment were painted a few shades of light yellow ochre and decorated with black veins and spots.

Pink was linked with the Baroque refurbishment of the market hall in Bolesławiec.

Yellow ochre or yellow was detected at a dwelling of the Renaissance origins, located at 5 ulica Katedralna in Wrocław. The building has been repainted roughly ten times since its erection. The fifth chronological layer that consisted of yellow paint was probably applied on the façade in the late 17<sup>th</sup> century.

Two different colour schemes discovered on a gate building in the Książ estate were linked to the Baroque period. The first colour scheme dated to 1719 was two-coloured: the walls were painted yellow ochre and the architectural details including stone parts were dark red/orange/yellow-ochre brown. The building was repainted in the late 18<sup>th</sup> century. The white colour was chosen for the walls whereas the architectural details were painted grey/ blue-grey (that hue was achieved by adding charcoal to lime) (see Figure 1).

Examinations of a palace annex erected in 1770-75 in Brzeg Dolny, the so-called small palace, did not allow to establish the original colours of elevation. However, it was established that the window frames were originally painted green (210/14 in the ISPO colour chart)<sup>6</sup>.

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<sup>5</sup> For information on colour schemes of the first chronological phases refer to Białobłocka (2014a) [3]. Documents revealed numerous data on colour schemes from repainting, but only part of them were dated and those are presented in the paper. Colour descriptions are cited as closely as possible to descriptions provided by conservationists in reports.

<sup>6</sup> The comparison to the ISPO colour chart was provided by the author of the report. The author of the article did not manage to detect this colour chart.

Tiny remains of ornate wall painting on the third floor's pilasters were detected on a dwelling at 25 Rynek, Świdnica. That decoration was linked to the late Baroque refurbishment in the second half of the 18<sup>th</sup> century.



Figure 1: The gate house of the Książ estate in Walbrzych. The building today (photo by the author, 2014). Sketches of the detected Baroque colour schemes: (upper drawing) colour scheme from the first phase, (lower drawing) colour scheme from the second phase. Photo by the author, sketches by Elżbieta Grabarczyk.

### ***The Historicism, Art Nouveau and Modernist Movement refurbishments***

Sand lime plaster painted grey-green applied during the 19<sup>th</sup> century refurbishment was detected on a tower of a church in Czernina Górna dated to the turn of the 16<sup>th</sup> and the beginning of the 17<sup>th</sup> century.

Grey-green was also detected on a dwelling at 5 ulica Katedralna in Wrocław. The eighth chronological layer of grey-green paint was probably applied in the 19<sup>th</sup> century.

Grey-green was probably applied to a medieval dwelling at 6 ulica Psie Budy, Wrocław, during the refurbishment in the second half of the 19<sup>th</sup> century (6<sup>th</sup> chronological phase). The neighbouring building at 5 ulica Psie Budy was repainted dark blue-grey at that time.

Red was discovered on the north elevation of the market hall in Radków and estimated as a colour applied during the 1885 refurbishment.

Red was also detected on cement plaster that covered the Renaissance building, the only remain of the royal castle. A conservator who examined elevations suggested that the use of no-lime binder, probably casein, indicated the very late origins of red paint - the 19<sup>th</sup> century or the beginning of the 20<sup>th</sup> century (see Figure 2).

Reddish pink was detected on a former royal palace at 34-35 ulica Kazimierza Wielkiego, Wrocław. The palace was built around 1719 and expanded a few times in the mid-18<sup>th</sup> century, late 18<sup>th</sup> century and mid-18<sup>th</sup> century. Examinations revealed that all the wings of the palace were covered the same sand-lime, light grey plaster and painted red-pink with a lighter shade applied to the walls and a darker shade to the window surrounds (250/12, 250/22, 260/21, 260/31 in the ISPO EuColor System colour chart). This colour scheme was linked to the 1858 expansion works when the wings were added (see Figure 3).





*Figure 2: Ulica Grodzka, Wrocław. The Renaissance remains of the royal castle were painted red during the recent refurbishment, a hue linked to the refurbishment at the turn of the 19th and 20th centuries (Photo by the author, 2012).*



*Figure 3: The former palace at 34-35 ulica Kazimierza Wielkiego, Wrocław. In the mid-19th century the wings were added and the whole palace was repainted reddish pink (Photo by the author, 2016).*

In Kliczków, a medieval castle was rebuilt in the Renaissance style and enlarged in the years 1881-83. It was estimated that beige was applied to the palace elevations during the 19<sup>th</sup>-century refurbishment, with the exception of stone parts that were left uncoated.

A classical palace in Brzeg Dolny, rebuilt in the neo-Renaissance style in the mid-19<sup>th</sup> century, could have been repainted monochromatically light yellow or green-yellow. Traces of lime paint resembled Palazzo 60 in the Caparol 3D+ colour chart.

The former 15<sup>th</sup>-century hospital at 1 ulica Kazimierza Wielkiego in Wrocław was rebuilt in the 18<sup>th</sup> and in the 19<sup>th</sup> centuries. It was suggested that the building was probably painted light green in the mid-19<sup>th</sup> century (Palma 14 in the Caparol colour chart).

Examinations of the Wrocław dwellings at 9, 10, 11, 12, 13 Sukiennice, erected in the years 1821-24, revealed the colour schemes used in the second half of the 19<sup>th</sup> century. At that time, the buildings were painted the following way: yellow (dwelling number 9), beige (number 10), yellow ochre and pink on the walls and cream, pink and white on details (number 11), brown on the walls and yellow ochre / pink on the architectural details (number 12), sandy/ brown (number 13). The dwellings at number 11 and 12 had lighter architectural details, otherwise the buildings were painted uniformly (see Figure 4).



*Figure 4: 9-13 Sukiennice, Wrocław. In the second half of the 19<sup>th</sup> century the row of classical dwellings was repainted in various hues: beige, brown, cream, pink, yellow ochre (Photo by the author, 2012).*

Shades of brown and beige were detected on a Mannerist façade at 2 Rynek, Wrocław. During the 19<sup>th</sup>-century refurbishment most of plaster was removed and the façade was repainted either brown or beige.

A monochromatic yellow ochre colour scheme was detected on a palace of the Renaissance origins in Posadowice. The palace was refurbished a few times, and yellow ochre was linked to the refurbishment and replacement of windows that took place in the second half of the 19<sup>th</sup> century.

A dwelling at 9 ulica Chrobrego in Kłodzko was rebuilt at the turn of the 19<sup>th</sup> and 20<sup>th</sup> centuries. Examinations demonstrated that at that time the façade was repainted ochre: the walls were of rusty ochre, the architectural details were painted light ochre, a sculpture of bear was dark brown.



Creamy-yellow ochre applied to the walls was linked to the 19th-century refurbishment of the Holy Trinity and St. Mary's church erected in Twardogóra in the 16th century. The timber elements of the entrance area imitated wood by design and colour – they were painted a shade of oak or walnut tree. Openwork was red and pale blue.

A palace in Komorowice was refurbished in the neo-Baroque style in the 19th century. At that time the palace was probably repainted pink and white: pink was applied to the walls whereas white to the architectural details.

The neo-Gothic polychrome from the beginning of the 20th century was discovered on a façade of the medieval Corpus Christi church at 26 ulica Świdnicka, Wrocław. The following intense hues were discovered: black, blue, red and white (see Figure 5).

The neo-Gothic building of a main railway station in Wrocław was expanded in 1899-1905, with Art Nouveau decorations applied inside the building. At that time, the exteriors were painted uniformly light grey-yellow ochre or green-yellow ochre. Sand stone details were exposed in their natural colour and the window frames were painted green.



*Figure 5: The Corpus Christi church, Wrocław. The medieval gable was painted in the 1920s (left). By Schlesischer Malerbund, 1928, vol. 11, 367-369. The detected colour scheme was restored a few years ago (right). Photo by the author, 2014.*

A conservator who examined the market hall in Dzierżoniów detected a colour scheme applied during the refurbishment around 1940. Old plaster was removed and the market hall and cloth hall were replastered and painted yellow ochre in two shades, the walls and windowsills were painted lighter shade and the window surrounds and cornices a darker shade.

A former castle in Wołów, erected in the 14th century and rebuilt a few times since then, was probably painted yellow ochre in the 1920s. The technique imitating stone that was used on the architectural details indicated the early 20th century.

Yellow ochre was also detected on the Holy Trinity church in Leśnica. The medieval church was rebuilt in the Baroque style and refurbished in the 19th and again in early 20<sup>th</sup> centuries. The discovered monochromatic yellow ochre colour scheme was linked to the early 20<sup>th</sup> century refurbishment.

The original colour of doors was detected on the railway station building Wrocław-Kuźniki, dated back to the early 20<sup>th</sup> century. The doors were painted dark green.

### **Repaints**

Data on repaints provides an insight into the way buildings were treated in regard to colour throughout centuries<sup>7</sup>. For a better comparison, most of the discussed below buildings were erected in the same époque, Baroque.

Nine chronological phases were detected on a façade of the late Renaissance dwelling at 22 ulica Chrobrego in Góra. The following colours were detected: dark grey/black stone imitation (1<sup>st</sup> chronological phase), yellow ochre (2<sup>nd</sup>), red pigmented plaster (3<sup>rd</sup>), yellow ochre with lighter shade applied to the architectural details (4<sup>th</sup>), green with darker shade on the architectural details (5<sup>th</sup>), yellow ochre with darker shade on the architectural details (6<sup>th</sup>), grey (7<sup>th</sup>), yellow ochre / yellow ochre with a pink tint with lighter shade on the architectural details (8<sup>th</sup>), grey or grey-green (9<sup>th</sup>).

Twelve chronological phases were detected on the elevations of the Baroque monastery at 15 plac Nankiera, Wrocław. The discoveries of the two first phases were partial. Later on, the building was repainted in the following way: yellow ochre with lighter architectural details (3<sup>rd</sup> phase), light yellow ochre with probably lighter architectural details (4<sup>th</sup> and 5<sup>th</sup> phases), yellow / yellow ochre (6<sup>th</sup>), green-yellow ochre (7<sup>th</sup>), yellow ochre (8<sup>th</sup> and 9<sup>th</sup>), green with darker architectural details (10<sup>th</sup>), yellow ochre - orange with lighter architectural details (11<sup>th</sup>), yellow ochre on the walls and white on the architectural details (12<sup>th</sup> phase dated to 1977).

Nine chronological phases were detected on a façade of the Baroque church of St. Anthony in Wrocław. Originally, the church was plastered but not painted (phase 0). Later on, it was repainted the following colours: grey walls and light cream architectural details (1<sup>st</sup> phase), grey with possibly lighter architectural details (2<sup>nd</sup> phase), yellow ochre (3<sup>rd</sup> phase), light yellow walls and red-pink architectural details (4<sup>th</sup> and 5<sup>th</sup> phases), yellow-green / yellow walls and white architectural details (6<sup>th</sup> and 7<sup>th</sup> phases).

Four chronological phases were detected on a palace in Żmigród dated to 1655-60 and rebuilt in 1706-08. The first chronological phase was dated to the turn of the 17th and the 18th centuries, pink was detected on the walls in one sample. The palace was repainted in the following way: light yellow or light cream, possibly in two different shades (2<sup>nd</sup> phase from 18th century); cream-yellow ochre walls and darker, yellow ochre architectural details (3<sup>rd</sup>); white walls and red architectural details (4<sup>th</sup> phase).

Three chronological phases were detected on the elevations of the Baroque church of St. Peter and Paul in Nysa: yellow ochre (1<sup>st</sup> phase), grey-blue (2<sup>nd</sup>), the third, contemporary phase was not described<sup>8</sup>.

Four chronological phases were detected on a church in Siciny. Originally, the church was painted pink and cream. Afterwards, it was repainted grey-blue (2<sup>nd</sup> phase) and then yellow (3<sup>rd</sup> phase). The building was refurbished and plastered, but not painted, in the 1960s (4<sup>th</sup> phase).

<sup>7</sup> The issue is worth being discussed as some architects and art historians are strongly convinced the buildings were repainted the same colours throughout centuries [10].

<sup>8</sup> The authors of examinations detected mineral pigments and described them as being typical for the 19th and 20th century, and suggested that yellow ochre was the original colour of the building as it was detected in most samples.



Ten chronological phases were discovered on the elevations of the former hospital of St. Matthias in Wrocław erected around 1810 on site of a demolished winery. The building was painted light and dark pink (1<sup>st</sup> phase); yellow (2<sup>nd</sup> phase from the first half of the 19<sup>th</sup> century); warm, intense brown (3<sup>rd</sup> phase); warm brown but lighter (4<sup>th</sup> phase); yellow ochre (5<sup>th</sup> phase from the turn of the 19<sup>th</sup> and 20<sup>th</sup> centuries); light, grey-blue (6<sup>th</sup> phase); beige (7<sup>th</sup> phase), light yellow ochre (8<sup>th</sup> phase); light beige (9<sup>th</sup> phase); a colour scheme from the time of examinations was not described (10<sup>th</sup> phase).

## Architectural paint research – methodology and documentation

There are common steps in the methodology of paint research but there are no regulations to execute them. As a result, it happens that examinations are reduced to the minimum despite the fact that such examinations would not provide meaningful conclusions. Due to the lack of established standards of paint research in Lower Silesia, the analysed examinations differed in terms of methods used, the scope and the methods of documentation. The analysis of reports stored in Silesian archives indicated differentiations in the following points: the methodology of paint research, the interpretation of discovered data, the manner of documentation, the manner of describing colours. Those differentiations are discussed in detail below as they influence the results of paint research and clarity of documentation<sup>9</sup>.

### *The methodology of paint research*

In regard to the methodology of paint research the following steps were differentiated by studying Silesian records: building history analysis that includes depictions and written sources; on-site analysis meaning observation by human eye without portable devices; microscope analysis of cross sections; chemical analysis in a laboratory of mortar and paint components; non-invasive methods (see Figure 6).

One of the first questions that emerges while reading the reports is who should conduct paint research that requires professional knowledge of historical building materials, binders and paints. The professional background of the authors of analysed documents differed enormously, from either chemists, art historians, architects to conservators (the latter group usually specialised in conservation of architectural details, but also in painting, paper or even leather)<sup>10</sup>.

In regard to the methodology, the first step are studies of archival data of examined buildings such as written sources and depictions as without them it is impossible to understand the history of a building, including transformations that took place throughout centuries. Well provided historical studies help to decide about the scope of examinations and are irreplaceable in terms of conclusions, yet, many of the analysed reports did not include them<sup>11</sup>.

Despite the advanced technology, numerous examinations were limited to on-site observations, made only by human eye. And as consequence, lack of complex methodology often resulted in partial

<sup>9</sup> In fact, an analysis of paint research documentation may rise many more questions than those discussed below. Those were considered from a point of view of an architect who, during the conservation process, has to read and understand those reports.

<sup>10</sup> Some conservators pointed out that a specialist in the field should take samples from a building and examine them as laypeople (including architects, art historians, etc.) can easily take samples from wrong places. From a private interview with conservators during doctoral studies.

<sup>11</sup> Several reports did not even include information on the date of the building erection but provided information on a colour scheme from the first chronological phase. So, how could it be decided that, e.g. white achieved by the use of titanium white (this paint has been used from the early 20th century) was the original colour of a medieval building?

discoveries - examinations made on-site without an analysis under the microscope and chemical analyses did not allow to estimate findings.

For example, records of the examinations of the Renaissance dwelling at 2 ulica Świętokrzyska in Świdnica does not provide information about the methodology used. Presumably, it was narrowed to in situ examinations and lacked chemical analysis, as it was concluded in the report that lime plaster and green paint on a gable were original, but grey discovered on the window surrounds was described as either paint, binder or patina.

Similar hesitation took place during examinations of a castle in Prószków. The building was rebuilt in the Baroque style in the years 1677-83. Relicts of flat, dark grey plaster were discovered on the walls and on the Baroque window surrounds; however, without the laboratory analysis it was not possible to state where the grey colour came from: it could have been a result of pigments used, technique or patina.

Examinations of the railway station building Wrocław-Kuźniki did not provide information on the original colour of the walls as the remains were covered with dirt and faded (examinations were limited to in-situ observations).

Re-examinations of a Wrocław dwelling at 16 ulica Wita Stwosza allowed to clarify results of first examinations that took place in 1998 and were limited to in-situ observations. At that time it was established that originally the building was painted intense yellow ochre. Conducted in 2013, second examinations included the analysis of selected samples under the microscope. During observation under the microscope it was clearly visible that yellow ochre was in fact a second chronological phase and the building was originally painted grey-green (see Figure 7).



*Figure 6: The difference in visibility of the sequence of plaster and paint layers on site and under the microscope. By the author (upper picture), courtesy by Barbara Kubisa (bottom picture).*



Figure 7: 16 ulica Wita Stwosza, Wrocław. Yellow ochre was estimated as the original colour by on-site observations (left). Re-examinations with the analysis of selected samples under the microscope revealed that the building was originally painted monochromatically grey-green. The grey-green layer of paint was visible beneath yellow ochre under the microscope (Photos by the author in 2012, 2015).

### **Time, tools and accessibility**

As there were comments in the documentation indicating that conservators did not have enough time or access to provide a proper examination or were not equipped well enough to conduct research, the other questions that emerged by studying the records was how much time is required for a proper examination? And what access to a building and tools should be provided for a conservator?

In regard to the equipment, the examinations of the 1545 town hall in Radków were reduced to in situ examinations. The discovered data was partial and revealed only the colour scheme dated to 1885. It was stated that discoveries of earlier phases were not possible due to hard cement plaster and a hammer was not sufficient in this situation.

Similar comments appeared in the record from examinations of a dwelling at 38 Rynek in Świdnica: it was not possible to detect the original colour scheme by in situ examinations because the building was covered with a heavy layer of cement plaster that had to be removed mechanically.

A church in Kryniczno was examined in situ. Apart from the limited methodology, a conservator who examined the church pointed out that the walls were examined using a wobbled ladder. The walls were scratched ten times and light yellow ochre on the windows surrounds and dark yellow ochre on the cornice were assumed to be a colour scheme from the 1752 in those work conditions.

In regard to accessibility to the examined building, conservators often noted in reports that the access to the elevations was not enough to conduct proper examinations. As a result, their findings were partial and uncertain, and required confirmation (second examinations) once scaffoldings were installed on site.



For example, the examinations of the former 15<sup>th</sup> century hospital of God's Tomb in Wrocław were limited due to 'narrow pavement and traffic'. For those reasons scaffoldings were not provided and samples had to be taken while leaning out from windows.

Examinations of the main railway station building were conducted by two different conservators, the first one prior the refurbishment and the other one - during the refurbishment. The first conservator had limited access to the building and the other conservator conducted examinations with full access during the refurbishment. As a result, the first conservator assumed that the building was probably originally painted light beige/ sandy hue. However, due to the better access to the building the other conservator established that the light yellow ochre was in fact the second chronological phase, and that the building was originally painted monochromatically intense yellow ochre-orange, with the exception of the stone parts exposed without painting. The window frames were painted dark brown (see Figure 8).



*Figure 8: The railway station Wrocław Główny - detail. The elevations were partially restored to the original colour scheme from the mid-19th century. The colour scheme was possible to detect due to the full access to the building.*

### ***The interpretation of discovered data***

The interpretation of the discovered data is an obvious and necessary part of the documentation, and has to be provided by a person who examined a building. However, it has happened that conclusions were omitted or findings were explained in a very complicated and unclear way.

Especially, numerous authors of reports described the discovered layers of paint as 'first chronological phases' but neither dated them nor indicated if the colour scheme described as 'of the first chronological phase' should be linked to the time of building erection or the later repainting.

For instance, five chronological phases were detected on a dwelling at 18 ulica Kościuszki in Lewin Kłodzki. Pink-red, close to 9183 in the KEIM colour chart, was assumed to have been the colour of the



first chronological phase. However, this monochromatic colour scheme was neither linked to the time of erection in 1773 nor to the time of refurbishment in the 19th century nor any other.

Furthermore, there were reports on samples indicating only the name of a colour without any further details concerning their origin. It may cause a great deal of confusion when conclusions are to be drawn by the reader as the colour of the first phase of one sample may come from quite a different period of time than the colour of the first phase of another sample. For example, colours were listed separately but not matched together in a document recording findings at a medieval dwelling at 4 Rynek in Wrocław. In this way, colour of the first phase of a ground floor level rebuilt more often than the walls above could be matched with colour of the walls above, and with colour of a gable added after the original gable was destroyed during World War II.

It was also confusing when a conservator who conducted paint research provided a few possible colour schemes described as from the first chronological phase. For example, the former orphanage located at 4 ulica Katedralna in Wrocław was examined in situ. A conservator who examined the Baroque building supposed that the north elevation was originally two-coloured: light yellow was applied to the walls and yellow ochre – orange to the architectural details. The conservator also presumed that the east elevation was originally three-coloured: yellow, orange and brown. According to the conservator, both versions could have been original colour schemes as they were similar; however, it was not clearly stated if the elevations were painted differently at the same time, or if both versions were possible, but only one of them was applied to the elevations (see Figure 9).



*Figure 9: The former orphanage at 4 ulica Katedralna, Wrocław was restored to one of two colour schemes suggested by a conservator who made an on-site examination (Photo by the author, 2012).*

A vague description was also provided for a tenement house at 38 ulica Nowowiejska in Wrocław. The description was limited to the note that warm colours such as cream, yellow ochre and white

dominated directly on ground in the initial phases. No further explanation was offered in regard to the colour arrangements.

Similarly, a conservator who conducted paint research on the dwelling at 5 ulica Krzywoustego in Oleśnica discovered three to four chronological phases. However, it was stated that the discovered layers of paint were not original as much more layers of paint should be discovered on a dwelling erected in the 1920s<sup>12</sup>.

Yet, some provided explanations occurred to be very detailed and valuable; nonetheless, conclusions were somehow unclear and brought more confusion. For example, two different examinations were conducted on a medieval dwelling at 6 Rynek in Wrocław, rebuilt in the Baroque style in 1727. The first examinations of the façade took place in 1988 and the other in 2006. The latter, which were by far more detailed, revealed up to six chronological phases. The third chronological phase was described as dark grey or grey (the walls were either black or dark grey, pilasters were dark grey and moulding – grey or yellow ochre). Those colours were detected directly on the same plaster that covered the walls and the Baroque window surrounds. This description seems to indicate the Baroque origins of that phase<sup>13</sup>, yet it was linked to the 19th-century refurbishment in the conclusion part (see Figure 10).



Figure 10: 6 Rynek, Wrocław. The building has been rebuilt and redecorated a few times since the Middle Ages. The second examinations revealed traces of colour schemes: red-pink paint (1st phase) and light yellow ochre (2nd phase), both possibly from the period before the Baroque refurbishment. The dark grey and grey colour scheme was discovered directly on the Baroque window surrounds (Photo and sketch by the author, 2013).

<sup>12</sup> Analysed data did not provide a rule how many layers of paint should be found on buildings from any époques. On the contrary, the amount of chronological phases varied even if the same methodology was used.

<sup>13</sup> Similar colour scheme was estimated as original Baroque colour scheme of the Trauston Palace in Vienna [3].

### ***The manner of documentation***

Generally speaking, documents aim to record the work for future references. The examined records varied from a single sheet of paper to a heavy report with tiny samples added to the documentation. A letter in a form of a single sheet of paper usually informed that examinations were conducted and provided information on colours of the first chronological phase without any explanation in what way the examinations were conducted. Most of the examined documents consisted of several pages and provided information on the goal of paint research, scope of the work, and colours that were detected. Some of reports provide a brief history of a building and discussed methodology of examinations including pictures taken on site, under the microscope and in the chemical laboratory. Some of the analysed reports included depictions of reconstructed colour schemes that additionally explained the intentions of the author of a record and helped to avoid confusion in case some information was missing in the text (see Figure 11).



*Figure 11: An example of a depiction of a discovered colour scheme that helps to understand achieved results and avoid wrong or unclear conclusions. Reconstruction drawing of the original colour scheme of the former Cistercian church and the mausoleum in Krzeszów. Drawings by Anna Dorak.*

It occurred that some information was missing in a report. For example, remains of lime paint were detected on the east elevation of a convent in Cieplice, Jelenia Góra. Remains were painted two colours: cream-yellow and light green. However, there was no information in a report on the width of vertical stripes and how those stripes were located on the elevation.

Examinations of a dwelling at 29 ulica Kiełbaśnicza in Wrocław revealed that the dwelling was repainted grey and white in the second half of the 18th century. However, the description of discovered colours was too general - it was only said that light shades of grey and white dominated both on plaster and stone. Due to lack of either detailed description or a depiction of a discovered colour scheme it is impossible to say how the discovered colours were arranged on the façade.



### ***The manner of describing colours***

The manner of describing colours also varied in the examined reports: colours and their shades were described in words, painted as samples, compared with numbers in various colour charts. Sometimes, a description of a colour was only limited to the number from one of many colour charts (sometimes with the international colour system NCS, but also with different colour charts currently available on the market). Sometimes, all the manners were used at the same time, but often they were limited to one of them.

For example, colour of the walls of a palace in Pobiednia was described as ‘intense colour close to AmphiSilan Fassadenfarbe Caparol-Oxidgelb 35 S1 or 35 S2, Sigma 1104-24 or 1075-24’. Without the colour chart it is not possible to tell what colour the palace was painted, and with time, some of colour charts may be lost for future references<sup>14</sup>.

In terms of manner of describing colours, it is also important to consider the rules of the language as mistakes appeared in the reports. The most common mistake seems to be the misunderstanding of the distinction between a description of a two-coloured object and a monochromatic object painted one or more shades of the same colour. It appeared that not everyone who write on colours was aware that ‘green and grey’ means something very different from ‘grey-green’ and from ‘green-grey’<sup>15</sup>.

Furthermore, descriptions of colours such as: ‘painted colour of stone’, ‘painted colour of brick’, ‘colour of iron red’, etc. are misleading (they presumably mean something to the author of the report but not necessary to the audience). For example, the expression ‘colour of stone’ is too vague - even if one would like to narrow colours of stone to those mined in Silesian quarries they vary from white, yellow, pink, red to grey and brown. Similarly, colours of medieval bricks vary in Silesia from cherry red to orange; and the issue becomes even more complicated as in the 19th century the colour range gets enriched by yellow, white, black, green, etc. and also purple in the early 20th century. Even a comparison to a pigment is risky as, for example, green earth is described in textbooks as either ‘green-grey’ or ‘grey-green’; an iron red pigment is described in textbooks in the following way: ‘iron reds differ in hues depending on the precise method of preparation and composition: light yellow, dark yellow, red, brown and chestnut’; etc. (see Figure 12).



*Figure 12: A description: painted colour of brick, or plaster or ochre may mean in fact one of a few colours. A few colours and shades of brick, plaster and mineral pigment ochre. Photos by the author, 2011-2013.*

<sup>14</sup> For example, many colours were described only by numbers of the colour chart of the Polifarb company that existed in the years 1950-80. The company was closed down and colour charts destroyed, making impossible to find out what colours were designed several years ago.

<sup>15</sup> ‘Green and grey’ means that an object is two-coloured, e.g. a building is green and grey when the walls are painted green and the architectural details are painted grey (or the opposite way). But a monochromatic object should be described as either green-grey or grey-green. In the first situation, a green-grey object is grey with a tint of green, whereas a grey-green object is green with a tint of grey. The same rule applies to the Polish language but spelling is different: *biało-czerwona flaga* (red and white flag), *szarozielony lub zielonoszary kamień* (grey-green or green-grey stone).



## Conclusions

The paper is supposed to promote the knowledge of historical colour schemes used in architecture, to increase the theoretical knowledge of the part of history of architecture and to help to develop the doctrine of conservation that aims to preserve monuments in their original state.

In terms of original colour schemes, the colours discussed above and applied during later repainting provide limited information about colour composition and pigments used, as many of the findings indicated only the use of particular colour somewhere on an exterior.

Revealed data on colours provided additional examples of the use of:

- pink, light yellow ochre in the Renaissance
- green (on window frames), grey, pink, yellow ochre, white, imitation of marble in the Baroque and Classicism
- brown, beige, light green, grey-green, red, yellow ochre in the Historicism
- green (on window frames) in the Modernist Movement<sup>16</sup>.

In terms of colour compositions, two two-coloured Baroque arrangements were detected on a gate building in Książ (the walls were lighter than the architectural details in both cases). Several monochromatic compositions were related to the Historicist style. Both solutions were detected, namely, the use of a single colour (e.g. the palace in Kliczków) and the differentiation of architectural details on the walls achieved by means of use of two shades of one colour (e.g. the palace at ulica Kazmierza Wielkiego, Wrocław). Two-coloured compositions were also used in the Historicism. For instance, of five houses at Sukiennice, Wrocław, three houses were painted monochromatically and two houses were two-coloured.

In terms of pigments used, the lab analysis indicated the use of charcoal mixed with lime (in this way a grey / blue-grey hue was achieved).

In regard to the way buildings were repainted throughout centuries, the discussed examples indicate that buildings were usually repainted different colour schemes. Compositions were changing from monochromatic to the two-coloured colour schemes (or the other way round) on the same building. Monochromatic compositions were also modified as buildings were painted uniformly one shade and repainted two shades of the same colour (or the other way round). In fact, shades were very rarely kept the same (even if colour was preserved).

The discussed examples of repainting also suggest that either no regular repainting took place in the past (layers of paint detected on buildings dated from the Baroque vary from three to eleven (!)), or some of examinations failed in detecting all the layers applied<sup>17</sup>.

The findings on colours that were applied during later repainting preliminarily indicate that those colours did not differ from colours that were applied at the same time on newly erected buildings<sup>18</sup>. All buildings, both newly erected and older, were painted colours used in the certain historical periods<sup>19</sup>.

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<sup>16</sup> Unfortunately, due to poor methodology, especially lack of microscopic and lab analyses, many of results may be wrong.

<sup>17</sup> The amount of layers detected were never questioned by conservators who conducted examinations (with one exception: 5 ulica Krzywoustego in Oleśnica) in spite of poor methodology used. In fact, few conservators indicated that the methodology applied (especially lack of lab analysis) influences negatively achieved results and pointed out that further, more complex examinations are needed.

<sup>18</sup> For information on colours from the first chronological phases refer to Białobłocka (2014a) [3].

<sup>19</sup> Due to limited findings, further research is necessary in order to establish characteristic colour schemes of each historical period.

Another aim of this paper is to stimulate discussion and inspire collaboration across the fields of architecture, conservation and history of art to take a closer look and examine potential possibilities that may stimulate development of paint research in Lower Silesia.

So far, examinations varied in terms of methodology used and for this reason they varied in terms of accuracy and were burdened with a different level of error. In regard to the methodology of paint research, the following problems have been detected: examinations limited to *in-situ* observations despite the fact that the methodology of paint research has developed throughout years as technology advanced; lack of clear interpretation of the discovered facts due to, e.g., the basic methodology used, especially the lack of building history analysis and/or microscopic and laboratory analyses; poor work environment (lack of tools, limited access to a building, limited time).

In regard to documentation and the manner of describing colours, it seems that the easiest manner to describe colours that would be clear to the future generations would be the most complex one: delivery of the most possible detailed written description, a coloured sample, and a number of internationally recognised NCS colour chart (a colour chart available to everyone).

To sum up, the improvement of the methodology of paint research with obligatory microscopic and laboratory analysis seems to be the most crucial and urgent issue as only standardised examinations and research, including their methodology, guarantee knowledge development in this particular field. This improvement would prevent poor quality examinations in the future. As a result, it will be possible to restore monuments preserving their original colour scheme.

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